Syllabus – IS 6733: Deep Learning on Cloud Platforms – Fall 2021

Instructor: Prof. Yuanxiong Guo (yuanxiong.guo@utsa.edu)

Meeting Time and Location (Asynchronous): Lecture videos and slides will be regularly uploaded to Blackboard throughout the semester. (08/23/2021 – 12/10/2021)

Office Hours (Synchronous): Online via Zoom, meeting time to be determined in the first week, and a student or a group of students can book a 15-min office hour appointment with the instructor using the following link: https://calendly.com/yuanxiong-guo/is6733-office-hour.

Course Description: This course presents students with basic understanding of modern neural networks (i.e., deep learning) and their applications in big data areas such as computer vision and natural language processing using Python. The course starts with a recap of big data trends, software/hardware used to analyze big data, traditional machine learning methods, and discussion of stochastic gradient descent that are crucial for training deep neural networks. Students will learn all of the popular neural network architecture including multilayer perceptron, convolutional neural networks, and recurrent neural networks. Students will also gain practical hands-on experience in common Python libraries including Jupyter Notebook/Colab, Pandas, Matplotlib, Scikit-learn and Keras/TensorFlow.

Prerequisite: IS 6713 – Data Foundations or equivalent.

Required Textbooks (Free Online or through UTSA Library):

- **[T1]** Jake VanderPlas, *Python Data Science Handbook: Essential Tools for Working with Data, O'Reilly,* 2016. https://jakevdp.github.io/PythonDataScienceHandbook/
  - Covers all essential Python libraries for Data Science
- **[T2]** Francois Chollet, *Deep learning with Python*, Manning Publications, 1st Edition, 2017. https://www.manning.com/books/deep-learning-with-python (unlimited access through UTSA Library)
  - Covers all the fundamentals of Deep Learning
  - Read Chapter 2 first if you are not familiar with basic math concepts such as matrix multiplication and derivatives, which are necessary for understanding the course contents.

Optional Textbooks/Resources (Free Online)

- **[T3]** Jake VanderPlas, *A Whirlwind Tour of Python*, *O'Reilly,* 2016. https://github.com/jakevdp/WhirlwindTourOfPython
  - A short tutorial to Python programming
  - Read this textbook first if you are not confident in Python programming language.

Course Schedule and Topics (Tentative):

The following schedule is tentative and subject to change as the instructor sees fit:

Week #	Course Contents	Reading Materials	Homework/Quiz (Due by the end of next Monday)
1	Course logistics; big data overview and characteristics		Quiz 1 and Quiz 2
2	Python tutorials (Colab/NumPy)	Chapter 1 ~ 2 of **[T1]** Chapter 2.1 ~ 2.3 of **[T2]**	Quiz 3
3	Python tutorials (Pandas/Matplotlib)	Chapter 3 ~ 4 of **[T1]**	Quiz 4 HW1
4	Deep learning overview	Chapter 1 of **[T2]**	Quiz 5
5	Machine learning fundamentals – Part 1	Chapter 4 of **[T2]** Chapter 5 of **[T1]**	Quiz 6
6	Machine learning fundamentals – Part 2		Quiz 7 HW2
7	Mid-term review and exam		
8	Neural network basics	Chapter 2 and Chapter 3.1 ~ 3.3 of **[T2]**	
9	Multi-layer perceptron	Chapter 3.4 ~ 3.6 of **[T2]**	Quiz 8
10	Convolutional neural network – Part 1	Chapter 5 of **[T2]**	HW3
11	Convolutional neural network – Part 2		Quiz 9
12	Recurrent neural network – Part 1	Chapter 6 of **[T2]**	
13	Recurrent neural network – Part 2		Quiz 10
14	Optional advanced topics (e.g., Google Cloud Platforms) – Thanksgiving Holiday		HW4
15	Final-term review		
16	Final exam		

Grading: The instructor reserves the right to curve the scale dependent on overall class scores at the end of the semester. Any curve will only ever make it easier to obtain a certain letter grade.

Quizzes (10)	20%
Homework Assignments (4)	20%
Mid-Term Exam (1)	30%
Final Exam (1)	30%

>= 98	A+	>= 82, < 88	B	>= 70, < 72	C-	< 60	F
>= 92, < 98	A	>= 80, < 82	B-	>= 68, < 70	D+		
>= 90, < 92	A-	>= 78, < 80	C+	>= 62, < 68	D		
>= 88, < 90	B+	>= 72, < 78	C	>= 60, < 62	D-		

Quiz Format, Grading, and Submission Policy:

- Each quiz consists of 5 ~ 10 short questions. The quiz questions consist of four types: Multiple Choice, Multiple Answer, True or False, and Numeric Answer. Note that there is no partial credit for Multiple Answer questions due to technical constraints in Blackboard.
- Quizzes must be submitted before the due date. Only one attempt is allowed. There is no time limit. No late submission will be accepted.
- You will see your quiz grade right after the submission. The solution videos to each quiz will be released right after its due date.

Homework Format, Grading, and Submission Policy:

- Each homework assignment consists of two Python programming questions. The programming questions must be completed in Google Colab using Python (https://colab.research.google.com/) and executable.
- There is an 10% penalty for turning in an assignment within 24 hours late and 20% penalty for tuning in an assignment within 48 hours late (according to the Blackboard recorded time; email or any other submission to the instructor does not count.) There is no grading for assignments submitted more than 48 hours late.
- To ease the grading in Blackboard, for each assignment please submit your answers to the Blackboard both in the PDF file with the major output results and public Colab shared link (open access to everyone) to your .ipynb source file. Any missing submission, other file formats (e.g., .py, .html), unclear, or email submission will not be accepted for grading. (Detailed submitted instructions are provided in Blackboard)
- Multiple attempts are allowed, but only the last attempt is graded. The grade for each homework assignment is available within one week of its due date. The solution to each homework assignment will be released after 48 hours of its due date.

Exam Format, Grading, and Submission Policy:

- Mid-Term Exam (online): Week 7
- Final Exam (online): Week 16
- The format of exams is the same as quizzes. There are 40 questions in total (2.5 points per question), consisting of four types: Multiple Choice, Multiple Answer, True or False, and Numeric Answer. No partial credit for Multiple Answer questions.
- Only one attempt is allowed, and you will have **two hours** during the exam period to finish the exam questions.

Course Contents and Communication: All lecture slides, course syllabus, quizzes, homework assignments, exams, solutions, and grading details will be posted on Blackboard

(https://utsa.blackboard.com/). All announcement about the course will be made on Blackboard. You are required to check the announcements and contents on Blackboard regularly.

There are several ways you can communicate with the instructor during this online course:

1. If you have a general and short question for content- and course-related questions, you can post it in the Blackboard Discussion Forum (e.g., due date, course release schedule, problem clarification) when the answer can benefit the entire class. Everyone in the class can see the question and the instructor's answer there.
2. If you have a specific or long question about the content- and course-related questions, please use the office hours for help. Students are expected to fully utilize the office hours for most content, quiz, homework, or exam related questions. If you cannot attend the regular office hours, use private "Course Messages" but attending the hour offices is where you can get most help and highly recommended.
3. Send emails to the instructor when you want to make appointments with the instructor, have other personal or urgent questions. Keep in mind, however, that the instructor cannot communicate about grades through email.
4. If you have a question about your grade, use the "Course Messages" tool to send a private message. Because of FERPA regulations, the instructor can only communicate individually with students about grades via Blackboard Course Messages. This communication stays in Blackboard and is the only secure way to discuss your grade. You will have to log in to Blackboard to send and receive these course messages.
5. To ensure fairness to every student, do not email your homework code to the instructor for debugging or pre-checking **before the due date**. Instead, you can summarize the specific points which you are not clear about so that the instructor can point out some additional references for you to check. **If you need extra help on your Python code debugging, you are encouraged to use the TutorMe Platform (https://tutorme.com/) that are provided to UTSA students for free.** Note that students are expected to complete their homework assignments by practicing their programming skills beyond the lecture slides and checking the posted homework solutions to learn the right answers to their questions after the due date.

The instructor will generally respond to all messages within 24 hours during weekdays. Please note the delay and prepare beforehand if you are catching up some deadlines. Office hours will be offered virtually in Zoom. Other face-to-face meeting times could be available if the appointment is made at least 24 hours in advance during weekdays. The most convenient way to reach the instructor is through the regular office hours.

Collaboration Policy: It is ok to discuss your homework with your classmates in high levels or refer to online resources, but each student must understand and complete his/her own assignments and hand in one assignment per student. Moreover, you need to clearly spell out the student names with whom you collaborate in your homework submission on your assignment on top. Any uncited similarity will be checked as suspicious plagiarism and may result in zero point for that homework. No collaboration is allowed on exams or quizzes.

Academic Integrity and Honesty: Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct. Any suspicious plagiarism on homework assignments and exams may result in zero point and will be reported to the university.

Computing Assistance: The College of Business Academic Computing Department, under the direction of John Soudah, has committed resources to assisting MSDA students with their laptops and connection to university data analytics resources. Please see them in BB 3.02.14, call 210-458-7829, or email them at apl@utsa.edu for assistance. Please cc your instructor on emails.

Counseling Services: Counseling Services provides confidential, professional services by staff psychologists, social workers, counselors and psychiatrists to help meet the personal and developmental needs of currently enrolled students. Services include individual brief therapy for personal and educational concerns, couples/relationship counseling, and group therapy on topics such as college adaptation, relationship concerns, sexual orientation, depression and anxiety. Counseling Services also screens for possible learning disabilities and has limited psychiatric services. Visit Counseling Services at http://utsa.edu/counsel/ or call (210) 458-4140 (Main Campus) or (210) 458-2930 (Downtown Campus).

Student Code of Conduct and Scholastic Dishonesty: The Student Code of Conduct is Section B of the Appendices in the Student Information Bulletin. Scholastic Dishonesty is listed in the Student Code of Conduct (Sec. B of the Appendices) under Sec. 203 http://catalog.utsa.edu/policies/administrativepoliciesandprocedures/studentcodeofconduct/

Students with Disabilities: The University of Texas at San Antonio in compliance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act provides "reasonable accommodations" to students with disabilities. Only those students who have officially registered with Student Disability Services and requested accommodations for this course will be eligible for disability accommodations. Instructors at UTSA must be provided an official notification of accommodation through Student Disability Services. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.utsa.edu/disability or by calling Student Disability Services at (210) 458-4157. Accommodations are not retroactive.

Transitory/Minor Medical Issues: In situations where a student experiences a transitory/minor medical condition (e.g. broken limb, acute illness, minor surgery) that impacts their ability to attend classes, access classes or perform tasks within the classroom over a limited period of time, the student should refer to the class attendance policy in their syllabus.

Supplemental Instruction: Supplemental Instruction offers student-led study groups using collaborative learning for historically difficult classes. Supported courses and schedules can be found on the TRC website. You can call the SI office if you have questions or for more information at (210) 458-7251.

Tutoring Services: Tomás Rivera Center (TRC) may assist in building study skills and tutoring in course content. The TRC has several locations at the Main Campus and is also located at the

Downtown Campus. For more information, visit the Tutoring Services web page or call (210) 458-4694 on the Main Campus and (210) 458-2838 on the Downtown Campus.

Academic Success Coaching: The Tomas Rivera Center (TRC) Academic Success Coaching Program offers one-on-one study skills assistance through Academic Coaching. Students meet by appointment with a professional to develop more effective study strategies and techniques that can be used across courses. Group workshops are also offered each semester to help students defeat common academic challenges. Find out more information on the TRC Academic Success Coaching website or call (210) 458-4694.

Sexual Harassment and Sexual Misconduct: UTSA is committed to providing an environment free from all forms of discrimination and sexual harassment, including sexual misconduct, sexual assault, domestic violence, dating violence, and stalking. If a student has experienced or experiences any of these incidents, know that UTSA has resources to help.

UTSA faculty have the responsibility to create a learning environment that is safe and free from hostility. State and federal law as well as UTSA's Handbook of Operating Procedures (HOP 9.24) require that instructors must report incidents of sexual harassment and sexual misconduct they learn about to the Title IX Coordinator or a Deputy Title IX Coordinator. This means that if a student tells their instructor about a situation (including classroom discussions, written work and/or one-on-one meetings) involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, the instructor must report it to the EOS/Title IX Office. Although the faculty member must report the situation, the student will still have options about how their case will be handled, including whether or not they wish to pursue a formal complaint. The university's goal is to make sure students are aware of the range of options available to them and have access to the resources they need.

If a student wishes to speak to someone confidentially, they can contact any of the following on-campus resources, who are not required to report the incident to the EOS/Title IX Office:
(1) Counseling Services at 210-458-4140; (2) Student Health Services at 210-458-4142; or
(3) PEACE Center at 210-458-4077.

Campus Safety & Emergency Preparedness: UTSA is committed to providing a safe campus environment for students, faculty, staff, and visitors. As members of the community, we encourage you to take the following actions to be better prepared in case of an emergency:

- Alerts: Ensure you are signed up for UTSA Alerts through your ASAP.utsa.edu account.
- Emergency Procedures: Read through the emergency response guide on the UTSA Alerts website (www.alerts.utsa.edu)
- Safety App: Download the LiveSafe App on your phone through the Apple store or Google Play; visit the UTSA Alerts website for details.
- Important Numbers: UTSA Police - Emergency: (210) 458-4911; Non-Emergency: (210) 458-4242

Each one of us play a critical role in making sure ALL ROADRUNNERS are safe, know what to do, and how to stay informed during a campus crisis. Don't be scared, be prepared! #UTSAprepared

Inclusivity Statement

The University of Texas at San Antonio, a Hispanic Serving Institution situated in a global city that has been a crossroads of peoples and cultures for centuries, values diversity and inclusion in all aspects of university life. As an institution expressly founded to advance the education of Mexican Americans and other underserved communities, our university is committed to ending generations of discrimination and inequity. UTSA, a premier public research university, fosters academic excellence through a community of dialogue, discovery and innovation that embraces the uniqueness of each voice. Learn more at https://www.utsa.edu/inclusiveexcellence.